



ENVIRONMENTAL STRATEGIES

300 Corporate Center Drive, Suite 200 • Moon Twp, Pennsylvania 15108 • (412) 604-1040 • Fax (412) 604-1055

**PCB CHARACTERIZATION – SB-71 PHASE II REPORT  
GE SILICONES, LLC PLANT  
FRIENDLY, WEST VIRGINIA**

**FINAL REPORT**

**PREPARED FOR  
CHEMTURA CORPORATION**

**PREPARED**

**BY**

**WSP ENVIRONMENTAL STRATEGIES LLC**

**DECEMBER 13, 2006**

**SISVIL012129**

**EPA000432**



ENVIRONMENTAL STRATEGIES

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## LETTER OF TRANSMITTAL

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TO: Chemtura Corporation  
199 Benson Road, MC# 2-4  
Middlebury, Connecticut 06749

DATE: December 13, 2006  
PROJECT NAME/DESCRIPTION:  
Sistersville PCB Investigation  
PROJECT No.: 131138-02  
FROM: Tom Biksey

ATTENTION: Mike Cote

---

**ITEMS  
TRANSMITTED**

☒ HEREWITHIN

☐ UNDER SEPARATE COVER

PCB Characterization – SB-71 Phase II Report

---

IF ENCLOSED ARE NOT AS NOTED, NOTIFY US AT ONCE.

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**ACTION TO  
BE TAKEN**

☐ PER YOUR REQUEST

☐ APPROVED AS NOTED

☐ FOR YOUR INFORMATION

☐ NOT APPROVED; REVISE AND SUBMIT

☐ FOR YOUR APPROVAL

☐ FOR YOUR COORDINATION

☐ FOR YOUR REVIEW AND COMMENT

☒ OTHER/DESCRIBE

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**REMARKS:**

Attached is the final PCB Characterization – SB-71 Phase II Report for the former Crompton OSi Specialties Group Sistersville facility.

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**COPY TO:**

Michael O'Donnell, GE Advanced Materials (1)

Tina Adams, GE Silicones LLC (4)

SIGNED:

SISVIL012130

EPA000433



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**Contents**

	<b>Page</b>
<b>1.0 Introduction</b>	<b>1</b>
<b>2.0 Background</b>	<b>3</b>
<b>3.0 Soil Characterization Activities</b>	<b>5</b>
<b>4.0 Data Evaluation</b>	<b>6</b>
<b>5.0 Summary and Recommendations</b>	<b>7</b>
<b>6.0 References</b>	<b>8</b>

**List of Figures:**

Figure 1 - Site Location Map

Figure 2 - Phase I and II Sampling Results – SB-71

**List of Tables:**

Table 1 - Summary of Phase I and II Sampling Results - SB-71

**List of Appendices:**

Appendix A - WSP Environmental Strategies Standard Operating Procedures

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EPA000435

## 1.0 Introduction

WSP Environmental Strategies LLC (formerly Environmental Strategies Consulting LLC), on behalf of Chemtura Corporation, conducted focused site characterization activities at the former Crompton OSi Specialties Group Sistersville facility. This facility was acquired by GE Silicones, LLC, from Crompton (now Chemtura) on July 31, 2003, as part of the overall purchase of the OSi business. GE currently occupies and operates the facility. Soil samples were collected to evaluate the extent of polychlorinated biphenyls (PCBs) in the vicinity of sample location SB-71 in the former Waste Incineration Area.

In 2004, a site investigation was conducted by ENVIRON International Corporation for GE in conjunction with GE's purchase of the facility (ENVIRON 2004). During that investigation, ENVIRON collected a soil sample (identified as SB-71) from the former Waste Incineration Area. Sample results for SB-71 indicated the presence of PCBs (specifically Aroclor 1248) at a concentration that exceeded the Toxic Substances Control Act (TSCA) cleanup level for PCBs of 25 milligrams per kilograms for low occupancy areas. In December 2005, WSP Environmental Strategies collected additional soil samples in the vicinity of SB-71 (activities designated as Phase I of the SB-71 PCB characterization) and recommended that further evaluation of this area be conducted (Environmental Strategies 2006a). Phase II of the SB-71 PCB characterization was performed by WSP Environmental Strategies in August 2006. The Phase I and II activities were conducted in accordance with Part 40 of the Code of Federal Regulations (CFR), Part 761.61, for characterization of potential PCB affected sites.

The Phase II characterization was completed in accordance with the draft Phase II PCB Characterization Work plan prepared by WSP Environmental Strategies, and dated May 9, 2006 (Environmental Strategies 2006a). The scope of work included:

- characterization of PCBs in soil in the vicinity of SB-71 using a grid sampling method
- data evaluation and analysis
- recommendations

All site activities, including note taking, sample collection and handling, decontamination, and quality assurance/quality control (QA/QC) procedures, were performed in accordance with WSP Environmental Strategies' standard operating procedures (SOPs) provided in Appendix A.

## 2.0 Background

The GE facility is located at 3500 South State Route 2 near Friendly, Tyler County, West Virginia (Figure 1). The facility is situated on approximately 1,300 acres in a relatively rural area adjacent to the Ohio River (at approximately River Mile 145). The footprint of the main production area comprises approximately 50 acres.

WSP Environmental Strategies and Chemtura personnel conducted a site visit on May 18, 2005, to interview facility personnel regarding the historical operations that may have resulted in a release of PCBs in the vicinity of SB-71, to verify the low occupancy status of the area proposed for characterization, and to preview potential sampling locations with regard to facility infrastructure and utilities. Interviews were conducted with Tina Adams, Dennis Heintzman, and Stephen Pierce. Both Mr. Heintzman and Mr. Pierce were employed at the facility for a sufficient amount of time to provide a historical perspective of the area proposed for characterization. Ms. Adams was the established environmental liaison for the site visit, obtaining facility records for review, and conducting the site walkover.

Site contacts stated that there was no documented release of PCBs in the SB-71 area. In addition, no transformers, hydraulic systems, or heat transfer systems that may have contained PCBs were known to have been used or stored in this area. It was noted that Union Carbide, a former owner of the facility, had conducted an extensive inventory of potential PCB-containing equipment and processes, and had removed some from service over a period of years.

The low occupancy area definition found at 40 CFR §761.3 includes any area where PCB remediation waste has been disposed of onsite, and where occupancy for any individual not wearing dermal and respiratory protection for a calendar year is less than 840 hours (an average of 16.8 hours per week) for nonporous surfaces and less than 335 hours (an average of 6.7 hours per week) for bulk remediation waste (soil). The site contacts noted that there are no designated work activities, and there is no storage, maintenance, or other support activity that occurs in the SB-71 area. As a result, the SB-71 area meets the low occupancy definition.

Utility maps were provided to WSP Environmental Strategies during the site visit from the facility engineering department. It was noted that the maps are updated on a regular basis. After the site visit, the relevant utilities on the maps provided by GE were digitized by WSP Environmental Strategies to prepare a base map. The base map including the underground utilities was used to identify the proposed sampling locations around SB-71 (Figure 2). There

were no utilities reported in the area of SB-71, except for an underground utility line to the south of sample location DP-44 running east to west. It is noted that there were some discrepancies in the location of utilities on adjoining maps, with utility designations not matching between the maps.

In December 2005, WSP Environmental Strategies conducted a Phase I PCB characterization of the SB-71 area. The Phase I characterization was performed in accordance with the PCB Characterization Work plan prepared by WSP Environmental Strategies and dated July 20, 2005 (Environmental Strategies 2005). The Phase I activities and data were presented in the PCB Characterization Report prepared by WSP Environmental Strategies dated May 2006 (Environmental Strategies 2006a).

During the Phase I characterization activities, WSP Environmental Strategies confirmed that soil in the area surrounding SB-71 contained PCBs at concentrations that exceeded the TSCA low occupancy cleanup level. It was determined that additional horizontal delineation was warranted and a Phase II work plan was prepared (Environmental Strategies 2006b)



### 3.0 SB-71 Phase II Soil Characterization Activities

The Phase II characterization in the SB-71 area was conducted in August 2006 by establishing a sampling grid with 25-foot intersections, around the original sampling grid established as part of the Phase I activities (Figure 2). Samples located at each grid intersection point immediately adjacent to an original grid intersection point, were designated as a primary sample locations. Samples at grid intersections 25 feet from the primary sample locations were designated as secondary sample locations. Modifications were made to the sample grid locations, based on field conditions including: areas of concrete, underground lines, and obstructions. The primary sample location (DP-76) and the secondary sample location (DP-92) were moved to approximately ten feet of their original locations because of the presence of obstructions. Three of the primary sample locations and nine of the secondary sample locations within the SB-71 area were not collected due to field conditions. Figure 2 shows the final primary and secondary sample locations.

At each location, soil samples were collected from depths of 3 to 6 inches beneath the surface cover or gravel, if present, using direct-push technology. An additional sample from each location was collected from 6 to 18 inches below the ground surface. After each sample was collected, the soil and sample location were characterized and logged in the field book. The samples were placed in a cooler with wet ice and chilled to 4° Celsius. A chain of custody form was completed and the samples delivered by WSP Environmental Strategies to Severn Trent Laboratories, Inc., in Pittsburgh, Pennsylvania samples.

The soil samples were submitted for laboratory analysis of PCBs by U.S. EPA Method SW-846 8082, and 16 of the samples also were analyzed for total organic carbon (TOC). In addition, three samples were collected as blind duplicate samples, and were submitted for laboratory analysis for QA/QC purposes. These results were not used for comparison with the sampling results presented in this report. A field blank also was collected during the sampling event. The primary samples were submitted to the laboratory to be analyzed immediately. The secondary samples were submitted to the laboratory, the initial extraction was completed, and the samples were archived pending the results of the primary sample analyses. Based on the analytical results for the primary samples, all of the archived samples were analyzed.

#### 4.0 Data Evaluation

The analytical data from the Phase I and II SB-71 soil characterization activities are summarized in Table 1 and on Figure 2. The concentrations of PCBs from the Phase I sampling ranged from 0.83 mg/kg at DP-46 (3 to 6 inches) to 590 mg/kg at DP-62 (6 to 18 inches). For the Phase II sampling, the concentrations of PCBs ranged from non-detect at several locations to 190 mg/kg at DP-91 (6 to 18 inches). The TOC values (Table 1) for the 14 samples analyzed ranged from 269 mg/kg at sample location DP-90(6 to 18 inches) to 14,500 mg/kg at sample location DP-78(3 to 6 inches).

At the 3- to 6-inch sampling interval, the analytical data suggest that the horizontal delineation is nearly complete. Additional characterization to define the limits of PCBs to concentrations less than 25 mg/kg would be warranted at DP-40, DP-42, DP-68, DP-71, and DP-78. At these locations, the PCB concentrations ranged from 32 mg/kg to 83 mg/kg. At the 6- to 18-inch interval, further delineation would be warranted in the vicinity of three sample locations where the concentrations of PCBs were greater than 100 mg/kg including DP-40 (210 mg/kg), DP-78 (130 mg/kg), and DP-91 (190 mg/kg). In addition, further delineation would be appropriate in the vicinity of samples DP-66, DP-68, DP-69, and DP-70. Concentrations of PCBs at these locations ranged from 27 mg/kg to 92 mg/kg.

## 5.0 Summary and Recommendations

Phase I and II PCB characterization activities were completed in the vicinity of SB-71 in a systematic manner by superimposing sampling grids over the areas of interest. The purpose of the delineation activities was to define the horizontal extent of PCBs in soil in the SB-71 area present at concentrations greater than 25 mg/kg, the TSCA cleanup level for low occupancy areas. Based on the data collected to date, horizontal delineation at the 3- to 6- inch depth interval has been completed at 19 of 24 locations that form the perimeter of the total area sampled. For the 6- to 18-inch interval, delineation has been completed at 17 of the 24 perimeter locations. Additional delineation is recommended in the vicinity of the sampling points where concentrations of PCBs exceed 25 mg/kg at each depth interval, including 6 sampling points at the 3- to 6- inch depth interval and 7 sampling points at the 6- to 18-inch interval (Figure 2).

To accomplish the horizontal delineation, accommodation will need to be made for sampling along the creek bank in the vicinity of DP-78, and for sampling beneath the concrete pad (Drum Flush Pad) in the vicinity of DP-42, DP-40, and DP-91. It is anticipated that a site visit and a meeting with GE facility personnel will be necessary to evaluate the physical restrictions along the creek and beneath the concrete pad and determine the best sampling strategy for these areas. Following that meeting, a Phase III work plan will be developed to complete the horizontal delineation activities.

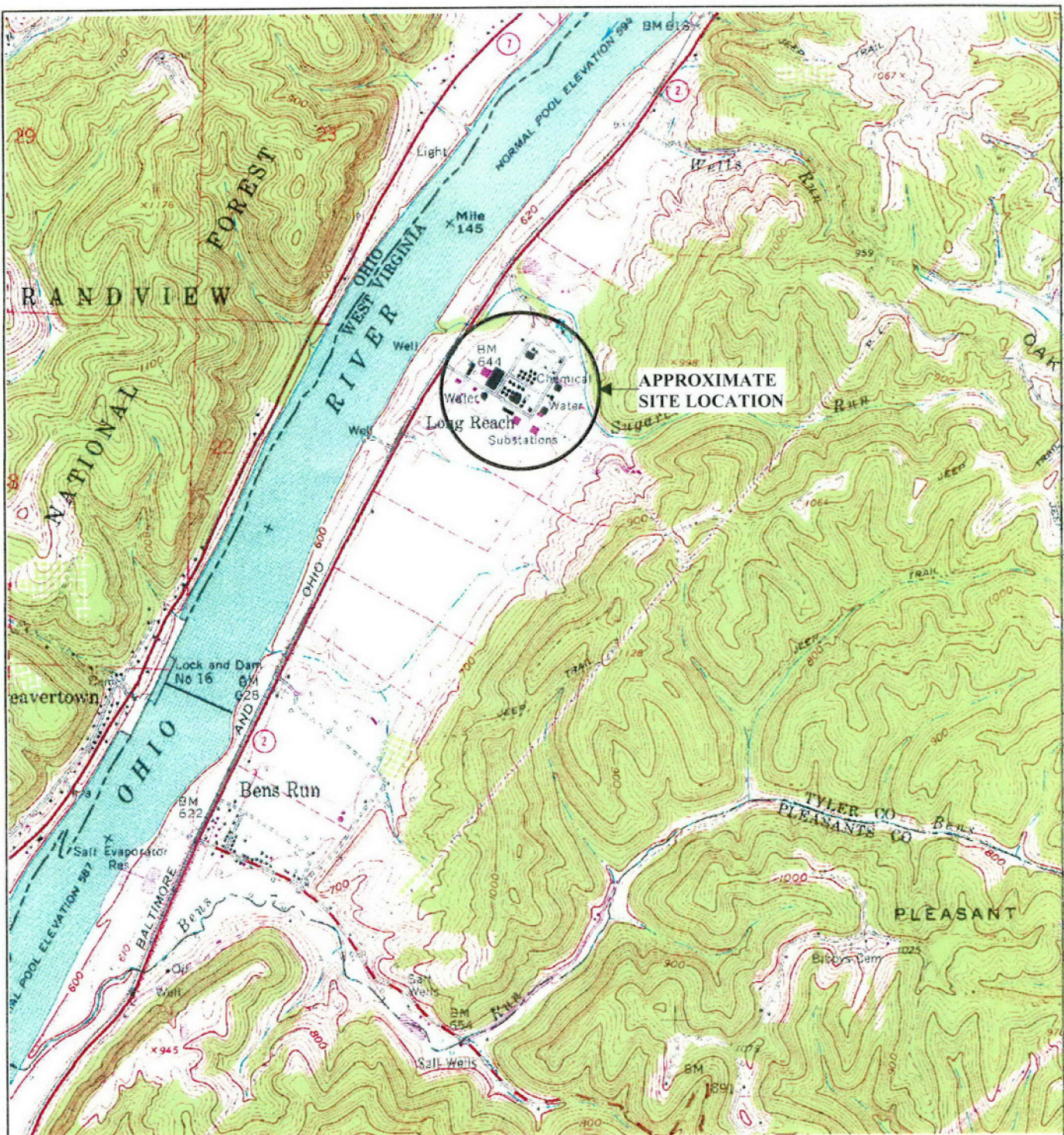
## 6.0 References

- Environmental Strategies Consulting LLC. 2005. PCB Characterization Work plan. Former Crompton Corporation Sistersville Facility, Friendly, West Virginia. July 20.
- Environmental Strategies Consulting LLC. 2006a. PCB Characterization Report, Former Crompton Corporation Sistersville Facility, Friendly, West Virginia. May 30.
- Environmental Strategies Consulting LLC. 2006b. Draft Phase II PCB Characterization Work plan, Former Crompton Corporation Sistersville Facility, Friendly, West Virginia. May 9.
- ENVIRON International Corporation. 2004. Phase II Investigation (Former Crompton Corporation/OSi Plant Sistersville, West Virginia). May.

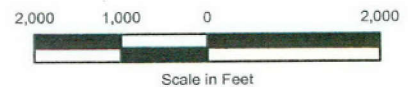
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## Figures





REFERENCE:  
USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE,  
BENS RUN  
WEST VIRGINIA  
PHOTOREVISED 1972.  
SCALE 1:24000



300 CORPORATE CENTER DRIVE, SUITE 200  
MOON TOWNSHIP, PA 15108  
412-604-1040

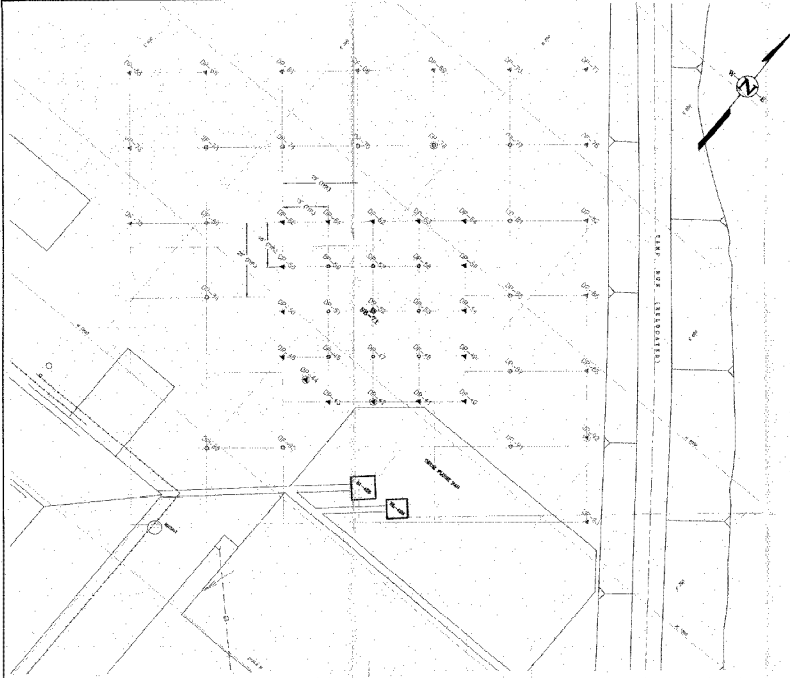
Figure 1  
Site Location  
GE Silicones, LLC Plant  
Friendly, West Virginia  
Prepared for  
Chemtura Corporation  
Middlebury, Connecticut

131138-02

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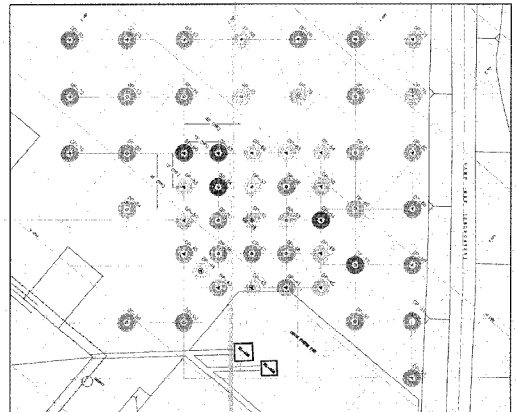
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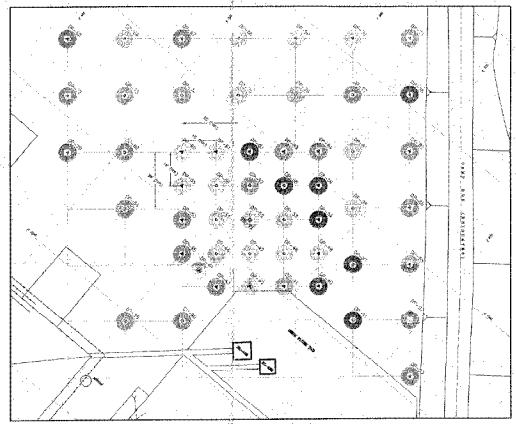


DOW/ARCO Sampling Results		
PCB Aroclor 1248 (mg/kg)		
Location	Depth (ft)	Height
SB-71	1.3 to 4	33
SB-71	1.3 to 14.5	6008

Phase I		
SB-71 Sampling Grid Results		
PCB Aroclor 1248 (mg/kg)		
Sample Interval (below ground surface)		
Location	3" to 6"	6" to 18"
DP-40	41	210
DP-41	13	16
DP-42	12	31
DP-43	8.5	6.3
DP-44	61	85
DP-45	8.3	6
DP-46	0.82	27
DP-47	6.1	24
DP-48	23	43
DP-49	47	33
DP-50	94	25
DP-51	18	69
DP-52	34	43
DP-53	30	71
DP-54	240	280
DP-55	28	64
DP-56	120	37
DP-57	26	34
DP-58	18	140
DP-59	62	120
DP-60	200	30
DP-61	130	63
DP-62	25	390
DP-63	35	3.5
DP-64	28	2.1



SB-71 SAMPLING GRID CONCENTRATION DISTRIBUTION  
3-INCH TO 6-INCH SAMPLE INTERVAL



SB-71 SAMPLING GRID CONCENTRATION DISTRIBUTION  
6-INCH TO 18-INCH SAMPLE INTERVAL

Phase II		
SB-71 Sampling Grid Results		
PCB Aroclor 1248 (mg/kg)		
Sample Interval (below ground surface)		
Location	3" to 6"	6" to 18"
DP-65	1.8	0.25
DP-66	30	52
DP-67	0.38	0.46
DP-68	12	92
DP-69	2.9	27
DP-70	16	69
DP-71	83	0.92
DP-72	0.0269	11
DP-73	15	0.68
DP-74	11	0.37
DP-75	67	47
DP-76	44	36
DP-77	14	13
DP-78	26	188
DP-79	0.034	11
DP-80	13	17
DP-81	16	61
DP-82	11	1.3
DP-84	0.18	41
DP-85	26	55
DP-86	15	1.2
DP-87	150	130
DP-88	4.4	1.8
DP-89	4.2	0.78
DP-90	8	32
DP-91	24	190
DP-92	16	0.12
DP-93	11	0.34

ALL PIPE LOCATIONS ON THE DRAWINGS USED TO CREATE THIS DRAWING (SEE REFERENCES) ARE NOT CONSISTENT. ALL LOCATIONS ARE BASED ON EXISTING SITE FEATURES.

- LEGEND**
- DP-45 ○ PRIMARY SAMPLING POINT (PHASE I)
  - DP-43 ▲ SECONDARY SAMPLING POINT (PHASE I)
  - DP-44 ● MODIFIED SECONDARY SAMPLING POINT (PHASE I)
  - DP-79 ● PREVIOUS SAMPLE POINT (DOW/ARCO)
  - DP-40 ○ PRIMARY SAMPLING POINT (PHASE II)
  - DP-50 ▲ SECONDARY SAMPLING POINT (PHASE II)
  - DP-76 ● MODIFIED SECONDARY SAMPLING POINT (PHASE II)
  - DP-52 ● MODIFIED SECONDARY SAMPLING POINT (PHASE II)
  - PCB AROCLOR 1248 CONCENTRATIONS 25 mg/kg OR LESS
  - PCB AROCLOR 1248 CONCENTRATIONS GREATER THAN 100 mg/kg

THE ORIGINAL VERSION OF THIS DRAWING IS IN COLOR. BLACK & WHITE REPRODUCTION MAY NOT ACCURATELY REFLECT COLORS REPRESENTED.

U = Not detected above certified detection limit.  
/ = Below detection limit.

**REVISIONS**

NO.	DATE	DESCRIPTION
1		
2		
3		
4		
5		

**PHASE I AND II SAMPLING RESULTS**

**SB-71**

GE SULLIVANS LLC PLANT  
FRENCH CREEK, WEST VIRGINIA  
PREPARED FOR  
CHEMURA CORPORATION  
MIDDLEBURY, CONNECTICUT

**WSP**

ENVIRONMENTAL STRATEGIES  
300 Corporate Center Drive, Suite 300  
Moon Township, Pennsylvania 15108  
412.400.1100

**FIGURE 2**

131138-D11

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## Tables



Final

Table 1

Summary of Phase I and II Sampling Results - SB-71  
GE Silicones, LLC Plant  
Friendly, West Virginia (a)

Sample ID:		DP-40		DP-41		DP-42		DP-43		DP-44	
Sample Depth (In-bgs):		3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18
Sample Date:		12/13/05	12/13/05	12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/14/05
PCBs (mg/kg)	CTLs (b)										
Aroclor 1016	25	1.8 U (c)	15 U	1 U	1.1 U	3.6 U	3.8 U	0.7 U	0.38 U	3.7 U	3.8 U
Aroclor 1221	25	1.8 U	15 U	1 U	1.1 U	3.6 U	3.8 U	0.7 U	0.38 U	3.7 U	3.8 U
Aroclor 1232	25	1.8 U	15 U	1 U	1.1 U	3.6 U	3.8 U	0.7 U	0.38 U	3.7 U	3.8 U
Aroclor 1242	25	1.8 U	15 U	1 U	1.1 U	3.6 U	3.8 U	0.7 U	0.38 U	3.7 U	3.8 U
Aroclor 1248	25	41	210	13	16	52	51	8.6	6.5	61	46
Aroclor 1254	25	1.8 U	15.0 U	1 U	1.1 U	3.6 U	3.8 U	0.7 U	0.38 U	3.7 U	3.8 U
Aroclor 1260	25	1.8 U	15 U	1 U	1.1 U	3.6 U	3.8 U	0.7 U	0.38 U	3.7 U	3.8 U
General Chemistry (mg/kg)											
Total Organic Carbon		NS	NS	NS	NS	NS	NS	965	NS	NS	2,150

Boxed value indicates concentration exceeds the CTLs

Final

Table 1

Summary of Phase I and II Sampling Results - SB-71  
GE Silicones, LLC Plant  
Friendly, West Virginia (a)

	Sample ID: Sample Depth (In-bgs): Sample Date:	DP-45		DP-46		DP-47		DP-48		DP-49	
		3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18
		12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/13/05	12/13/05
PCBs (mg/kg)	CTLs (b)										
Aroclor 1016	25	0.71 U	0.37 U	0.037 U	1.9 U	0.37 U	1.8 U	1.8 U	3.7	3.5 U	3.8 U
Aroclor 1221	25	0.71 U	0.37 U	0.037 U	1.9 U	0.37 U	1.8 U	1.8 U	3.7 U	3.5 U	3.8 U
Aroclor 1232	25	0.71 U	0.37 U	0.037 U	1.9 U	0.37 U	1.8 U	1.8 U	3.7 U	3.5 U	3.8 U
Aroclor 1242	25	0.71 U	0.37 U	0.037 U	1.9 U	0.37 U	1.8 U	1.8 U	3.7 U	3.5 U	3.8 U
Aroclor 1248	25	8.3	6	0.83	37	6.1	28	25	43	47	53
Aroclor 1254	25	0.71 U	0.37 U	0.037 U	1.9 U	0.37 U	1.8 U	1.8 U	3.7 U	3.5 U	3.8 U
Aroclor 1260	25	0.71 U	0.37 U	0.037 U	1.9 U	0.37 U	1.8 U	1.8 U	3.7 U	3.5 U	3.8 U
General Chemistry (mg/kg)											
Total Organic Carbon	-	NS	NS	NS	4,390	NS	NS	NS	5,680	NS	2,600

Boxed value indicates concentration exceeds the CTLs

Final

Table 1

Summary of Phase I and II Sampling Results - SB-71  
GE Silicones, LLC Plant  
Friendly, West Virginia (a)

Sample ID:		DP-50		DP-51		DP-52		DP-53		DP-54	
Sample Depth (In-bgs):		3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18
Sample Date:		12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/13/05	12/13/05
PCBs (mg/kg)	CTLs (b)										
Aroclor 1016	25	7.3 U	1.8 U	1.1 U	5.5 U	1.8 U	0.036 U	7.3 U	7.2 U	11 U	7.6 U
Aroclor 1221	25	7.3 U	1.8 U	1.1 U	5.5 U	1.8 U	0.036 U	7.3 U	7.2 U	11 U	7.6 U
Aroclor 1232	25	7.3 U	1.8 U	1.1 U	5.5 U	1.8 U	0.036 U	7.3 U	7.2 U	11 U	7.6 U
Aroclor 1242	25	7.3 U	1.8 U	1.1 U	5.5 U	1.8 U	0.036 U	7.3 U	7.2 U	11 U	7.6 U
Aroclor 1248	25	94	25	19	63	34	43	93	71	240	280
Aroclor 1254	25	7.3 U	1.8 U	1.1 U	5.5 U	1.8 U	0.036 U	7.3 U	7.2 U	11 U	7.6 U
Aroclor 1260	25	7.3 U	1.8 U	1.1 U	5.5 U	1.8 U	0.036 U	7.3 U	7.2 U	11 U	7.6 U
General Chemistry (mg/kg)											
Total Organic Carbon	.	NS	NS	NS	NS	NS	4,070	8,720	NS	5,740	NS

Boxed value indicates concentration exceeds the CTLs

Final

Table 1

Summary of Phase I and II Sampling Results - SB-71  
GE Silicones, LLC Plant  
Friendly, West Virginia (a)

Sample ID:		DP-55		DP-56		DP-57		DP-58		DP-59	
Sample Depth (In-bgs):		3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18
Sample Date:		12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/13/05	12/13/05	12/13/05	12/13/05
PCBs (mg/kg)	CTLs (b)										
Aroclor 1016	25	2 U	3.7 U	11 U	3.8 U	1.9 U	1.1 U	1.1 U	14 U	7.2 U	11 U
Aroclor 1221	25	2 U	3.7 U	11 U	3.8 U	1.9 U	1.1 U	1.1 U	14 U	7.2 U	11 U
Aroclor 1232	25	2 U	3.7 U	11 U	3.8 U	1.9 U	1.1 U	1.1 U	14 U	7.2 U	11 U
Aroclor 1242	25	2 U	3.7 U	11 U	3.8 U	1.9 U	1.1 U	1.1 U	14 U	7.2 U	11 U
Aroclor 1248	25	28	64	120	57	26	14	18	140	62	120
Aroclor 1254	25	2 U	3.7 U	11 U	3.8 U	1.9 U	1.1 U	1.1 U	14 U	7.2 U	11 U
Aroclor 1260	25	2 U	3.7 U	11 U	3.8 U	1.9 U	1.1 U	1.1 U	14 U	7.2 U	11 U
General Chemistry (mg/kg)											
Total Organic Carbon	-	NS	NS	8,780	NS	NS	NS	NS	NS	NS	NS

Boxed value indicates concentration exceeds the CTLs

Final

Table 1

Summary of Phase I and II Sampling Results - SB-71  
GE Silicones, LLC Plant  
Friendly, West Virginia (a)

Sample ID:		DP-60		DP-61		DP-62		DP-63		DP-64	
Sample Depth (In-bgs):		3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18
Sample Date:		12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/14/05	12/13/05	12/13/05	12/13/05	12/13/05
PCBs (mg/kg)	CTLs (b)										
Aroclor 1016	25	17 U	2.2 U	15 U	3.8 U	1.9 U	3.8 U	1.8 U	0.19 U	1.8 U	0.073 U
Aroclor 1221	25	17 U	2.2 U	15 U	3.8 U	1.9 U	3.8 U	1.8 U	0.19 U	1.8 U	0.073 U
Aroclor 1232	25	17 U	2.2 U	15 U	3.8 U	1.9 U	3.8 U	1.8 U	0.19 U	1.8 U	0.073 U
Aroclor 1242	25	17 U	2.2 U	15 U	3.8 U	1.9 U	3.8 U	1.8 U	0.19 U	1.8 U	0.073 U
Aroclor 1248	25	200	30	130	63	28	590	35	3.5	28	2.1
Aroclor 1254	25	17 U	2.2 U	15 U	3.8 U	1.9 U	3.8 U	1.8 U	0.19 U	1.8 U	0.073 U
Aroclor 1260	25	17 U	2.2 U	15 U	3.8 U	1.9 U	3.8 U	1.8 U	0.19 U	1.8 U	0.073 U
General Chemistry (mg/kg)											
Total Organic Carbon	-	7,380	NS	7,500	NS	NS	NS	NS	NS	NS	2,400

Boxed value indicates concentration exceeds the CTLs

Final

Table 1

Summary of Phase I and II Sampling Results - SB-71  
GE Silicones, LLC Plant  
Friendly, West Virginia (a)

	Sample ID: Sample Depth (In-bgs): Sample Date:	DP-65		DP-66		DP-67		DP-68	
		3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18
		08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06
PCBs (mg/kg)	CTLs (b)								
Aroclor 1016	25	0.39 U	0.035 U	1.8 U	3.7 U	0.056 U	0.1 U	1.1 U	7.8 U
Aroclor 1221	25	0.39 U	0.035 U	1.8 U	3.7 U	0.056 U	0.1 U	1.1 U	7.8 U
Aroclor 1232	25	0.39 U	0.035 U	1.8 U	3.7 U	0.056 U	0.1 U	1.1 U	7.8 U
Aroclor 1242	25	0.39 U	0.035 U	1.8 U	3.7 U	0.056 U	0.1 U	1.1 U	7.8 U
Aroclor 1248	25	3.8	0.35	20	52	0.58	0.46	32	92
Aroclor 1254	25	0.39 U	0.035 U	1.8 U	3.7 U	0.056 U	0.1 U	1.1 U	7.8 U
Aroclor 1260	25	0.39 U	0.035 U	1.8 U	3.7 U	0.056 U	0.1 U	1.1 U	7.8 U
General Chemistry (mg/kg)									
Total Organic Carbon	-	NS	NS	NS	2,410	NS	NS	NS	NS

Boxed value indicates concentration exceeds the CTLs

Final

Table 1

Summary of Phase I and II Sampling Results - SB-71  
GE Silicones, LLC Plant  
Friendly, West Virginia (a)

Sample ID:		DP-69		DP-70		DP-71		DP-72		DP-73	
Sample Depth (In-bgs):		3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18
Sample Date:		08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06
PCBs (mg/kg)		CTLs (b)									
Aroclor 1016	25	0.2 U	1.1 U	1.1 U	3.6 U	7.3 U	0.037 U	0.037 U	0.034 U	1.8 U	0.038 U
Aroclor 1221	25	0.2 U	1.1 U	1.1 U	3.6 U	7.3 U	0.037 U	0.037 U	0.034 U	1.8 U	0.038 U
Aroclor 1232	25	0.2 U	1.1 U	1.1 U	3.6 U	7.3 U	0.037 U	0.037 U	0.034 U	1.8 U	0.038 U
Aroclor 1242	25	0.2 U	1.1 U	1.1 U	3.6 U	7.3 U	0.037 U	0.037 U	0.034 U	1.8 U	0.038 U
Aroclor 1248	25	2.9	27	16	63	83	0.92	0.026 J	0.034 U	15	0.66
Aroclor 1254	25	0.2 U	1.1 U	1.1 U	3.6 U	7.3 U	0.037 U	0.037 U	0.034 U	1.8 U	0.038 U
Aroclor 1260	25	0.2 U	1.1 U	1.1 U	3.6 U	7.3 U	0.037 U	0.037 U	0.034 U	1.8 U	0.038 U
General Chemistry (mg/kg)											
Total Organic Carbon	-	NS	2,280	3,060	NS	NS	NS	1,220	NS	10,700	NS

Boxed value indicates concentration exceeds the CTLs

Final

Table 1

SB-71 Sampling Grid Results  
GE Silicones, LLC Plant  
Friendly, West Virginia (a)

Sample ID:		DP-74		DP-75		DP-76		DP-77		DP-78	
Sample Depth (In-bgs):		3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18
Sample Date:		08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06
PCBs (mg/kg)		CTLs (b)									
Aroclor 1016	25	0.576 NC	0.099 U	7.2 U	3.8 U	3.8 U	3.9 U	1.8 U	1.8 U	1.8 U	7.4 U
Aroclor 1221	25	1.1 U	0.099 U	7.2 U	3.8 U	3.8 U	3.9 U	1.8 U	1.8 U	1.8 U	7.4 U
Aroclor 1232	25	1.1 U	0.099 U	7.2 U	3.8 U	3.8 U	3.9 U	1.8 U	1.8 U	1.8 U	7.4 U
Aroclor 1242	25	1.1 U	0.18	7.2 U	3.8 U	3.8 U	3.9 U	1.8 U	1.8 U	1.8 U	7.4 U
Aroclor 1248	25	11	0.37	67	47	44	36	14	13	26	130
Aroclor 1254	25	1.1 U	0.099 U	7.2 U	3.8 U	3.8 U	3.9 U	1.8 U	1.8 U	1.8 U	7.4 U
Aroclor 1260	25	0.576 NC	0.099 U	7.2 U	3.8 U	3.8 U	3.9 U	1.8 U	1.8 U	1.8 U	7.4 U
General Chemistry (mg/kg)											
Total Organic Carbon	-	NS	NS	NS	2,680	NS	NS	NS	2,020	14,500	NS

Boxed value indicates concentration exceeds the CTLs



Final

Table 1

SB-71 Sampling Grid Results  
GE Silicones, LLC Plant  
Friendly, West Virginia (a)

Sample ID:		DP-79		DP-80		DP-81		DP-82		DP-84	
Sample Depth (In-bgs):		3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18
Sample Date:		08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06
PCBs (mg/kg)	CTLs (b)										
Aroclor 1016	25	0.039 U	0.037 U	0.037 U	0.038 U	1.8 U	3.8 U	0.036 U	0.76 U	0.034 U	0.038 U
Aroclor 1221	25	0.039 U	0.037 U	0.037 U	0.038 U	1.8 U	3.8 U	0.036 U	0.76 U	0.034 U	0.038 U
Aroclor 1232	25	0.039 U	0.037 U	0.037 U	0.038 U	1.8 U	3.8 U	0.036 U	0.76 U	0.034 U	0.038 U
Aroclor 1242	25	0.039 U	0.037 U	0.037 U	0.038 U	1.8 U	3.8 U	0.036 U	0.76 U	0.034 U	0.038 U
Aroclor 1248	25	0.018 J	0.037 U	0.037 U	0.038 U	16	61	0.036 U	1.3	0.18	0.038 U
Aroclor 1254	25	0.039 U	0.037 U	0.0072 J	0.038 U	1.8 U	3.8 U	0.036 U	0.76 U	0.034 U	0.038 U
Aroclor 1260	25	0.039 U	0.037 U	0.037 U	0.038 U	1.8 U	3.8 U	0.036 U	0.76 U	0.034 U	0.038 U
General Chemistry (mg/kg)											
Total Organic Carbon	-	NS	412	NS	NS	NS	NS	NS	NS	NS	NS

Boxed value indicates concentration exceeds the CTLs

Final

Table 1

SB-71 Sampling Grid Results  
GE Silicones, LLC Plant  
Friendly, West Virginia (a)

Sample ID:		DP-85		DP-86		DP-87		DP-88		DP-89	
Sample Depth (In-bgs):		3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18
Sample Date:		08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06
PCBs (mg/kg)		CTLs (b)									
Aroclor 1016	25	1.9 U	3.8 U	1.1 U	0.77 U	18 U	19 U	0.38 U	0.4 U	0.382 NC	0.038 U
Aroclor 1221	25	1.9 U	3.8 U	1.1 U	0.77 U	18 U	19 U	0.38 U	0.4 U	0.38 U	0.038 U
Aroclor 1232	25	1.9 U	3.8 U	1.1 U	0.77 U	18 U	19 U	0.38 U	0.4 U	0.38 U	0.038 U
Aroclor 1242	25	1.9 U	3.8 U	1.1 U	0.77 U	18 U	19 U	0.38 U	0.4 U	0.38 U	0.038 U
Aroclor 1248	25	26	55	15	1.2	150	130	4.4	1.8	4.3	0.78
Aroclor 1254	25	1.9 U	3.8 U	1.1 U	0.77 U	18 U	19 U	0.38 U	0.4 U	0.38 U	0.038 U
Aroclor 1260	25	1.9 U	3.8 U	1.1 U	0.77 U	18 U	19 U	0.38 U	0.4 U	0.38 U	0.038 U

General Chemistry (mg/kg)

Total Organic Carbon	-	5,740	NS	NS	NS	9,000	NS	NS	14,100	NS	NS
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Boxed value indicates concentration exceeds the CTLs

Final

Table 1

SB-71 Sampling Grid Results  
GE Silicones, LLC Plant  
Friendly, West Virginia (a)

Sample ID:		DP-90		DP-91		DP-92		DP-93	
Sample Depth (In-bgs):		3-6	6-18	3-6	6-18	3-6	6-18	3-6	6-18
Sample Date:		08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06	08/09/06
PCBs (mg/kg)	CTLs (b)								
Aroclor 1016	25	0.73 U	0.038 U	1.9 U	20 U	1.1 U	0.039 U	1 U	0.037 U
Aroclor 1221	25	0.73 U	0.038 U	1.9 U	20 U	1.1 U	0.039 U	1 U	0.037 U
Aroclor 1232	25	0.73 U	0.038 U	1.9 U	20 U	1.1 U	0.039 U	1 U	0.037 U
Aroclor 1242	25	0.73 U	0.038 U	1.9 U	20 U	1.1 U	0.039 U	1 U	0.037 U
Aroclor 1248	25	8	0.038 U	24	190	16	0.12	11	0.34
Aroclor 1254	25	0.73 U	0.038 U	1.9 U	20 U	1.1 U	0.039 U	1 U	0.037 U
Aroclor 1260	25	0.73 U	0.038 U	1.9 U	20 U	1.1 U	0.039 U	1 U	0.037 U
General Chemistry (mg/kg)									
Total Organic Carbon	-	NS	269	NS	NS	NS	NS	6,850	NS

Boxed value indicates concentration exceeds the CTLs

a/ In-bgs = inches below ground surface; DP = direct push; mg/kg = milligrams per kilogram; CTL = cleanup target level; PCBs = polychlorinated biphenyls; NS = not sampled.

b/ U.S. EPA 40 CFR (Chapter I, Subchapter R, § 761(i)(B)): PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions.

c/ Data qualifier

U = not detected above method detection limit.

J = estimated result. Result is less than the reporting limit (RL)

NS = not sampled.

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**Appendix A – WSP Environmental Strategies Standard Operating Procedures**



**SISVIL012156**

**EPA000459**

**WSP ENVIRONMENTAL STRATEGIES LLC**  
**STANDARD OPERATING FIELD PROCEDURES**

**SISVIL012157**

**EPA000460**

## Standard Operating Field Procedures

### Table of Contents

<u>Procedure No.</u>	<u>Topic</u>
1 ✓	Note Taking and Log Book Entries
2 ✓	Sample Container, Preservatives, and Holding Times (Table 1)
9	Soil Sampling Using Bucket Auger
11	Soil Sampling Using Hand Trowel
19 ✓	Decontamination of Sampling Equipment
20 ✓	Sample Shipping Procedures
21	Field QA/QC Samples
22 ✓	Soil Head Space Screening (Field Procedure)
23	Underground Utility Locating
24	Soil Sampling Using GeoProbe® System or Equivalent

## Standard Operating Procedure – 1

### Note Taking and Log Book Entries

#### Materials:

Permanently bound log book (no spiral-bound log books)  
Black or blue ballpoint pen (waterproof ink)

#### Procedure:

1. Use black or blue ballpoint pen with waterproof ink. Felt-tip pens should not be used.
2. Reserve the inside front cover for business cards from key personnel who visit the site (including the person in charge of the log book).
3. On the first page of the log book, place a return for reward notice, WSP Environmental Strategies' phone number, and the project manager's name.
4. Enter the following on the second page of the log book: project name, project number, project manager's name, onsite contacts, onsite telephone number and address, telephone numbers for all key personnel, and emergency fire and medical telephone numbers.
5. Number each page, initial each page, and put the date at the top of each page. Start a new page for each day. At the end of a day, summarize the day's activities, sign the page, and put a slash through the rest of the blank lines. Start the next day on a new page.
6. Enter the time (in military time, e.g., 0830) in the left column of each page when an entry is recorded in the field notebook.
7. If a mistake is made in an entry, cross out the mistake with one line and initial the end of the line.
8. At all times, maintain the chain of custody on the field log book.

#### Content:

1. Be sure that log book entries are LEGIBLE and contain accurate and inclusive documentation of project field activities.
2. Provide sufficient detail to enable others to reconstruct the activities observed.
3. Thoroughly describe all field activities while onsite. Be objective, factual, and thorough. Language should be free of personal feelings or other terminology that might prove inappropriate.
4. Describe problems, delays, and any unusual occurrences such as wrong equipment or breakdowns along with the resolutions and recommendations that resulted.
5. Fully document any deviations from or changes in the work plan.
6. Describe the weather and changes in the weather, particularly during sampling events.

7. Sketch a map of the facility or areas onsite where activities are occurring, especially the location of sampling points.
8. During sampling activities, record all information pertaining to the sampling event. Include descriptive locations and diagrams of the sample locations, time, sample media, analysis, sampling procedure, equipment used, sizes and types of containers, preservation and any resulting reactions, sampling identification (especially for duplicate samples), shipping procedures (record airbill numbers), and addresses.
9. Note decontamination or disposal procedures for all equipment, samples, and protective clothing and how effectively each is performed.
10. If possible, photograph all sample locations and areas of interest. Maintain a photographic log in the field log book and include:

Date, time, photographer, name of site, general direction faced, description of the subject taken, and sequential number of the photograph and the roll number.
11. Record the names and affiliations of key personnel onsite each day.
12. List all field equipment used and record field measurements, including distances, monitoring and testing instrument readings (e.g., photoionization detector (PID), organic vapor analyzer (OVA), pH, conductivity, model numbers, etc.), and calibration activities.
13. Record proposed work schedules and changes in current schedules in the log book.
14. Describe site security measures.
15. Include drum inventory for all investigation-derived waste (IDW) materials generated during site activities. Provide information on how IDW material was labeled.



## Standard Operating Procedure - 2

### Sample Container, Preservatives, & Holding Times

#### Scope:

This operating procedure describes the ways and means of selecting the appropriate sampling containers for environmental sampling.

#### Application:

The purpose of this procedure is to assure that sample volumes and preservatives are sufficient for analytical services required under EPA-approved protocols.

#### Materials:

Sample containers  
Sample container labels  
Indelible (waterproof) markers or pens  
Clear tape

#### Procedures:

1. Refer to Table 1 for minimum sample volume and glassware types required for sampling a particular matrix and compound class.
2. Select the appropriate glassware (i.e., bottles or jars) from those provided by the analytical laboratory. Verify that the analytical laboratory has provided the correct number of sample containers and the correct preservatives for the project per the sampling plan requirements.
3. The analytical laboratory should always provide extra sample containers for all analytical parameters in case of breakage or other problems encountered in the field. This is particularly true for VOC sample containers (i.e., 40-ml vials).
4. Report any discrepancies or non-receipt of specific types of sample containers to the Quality Assurance Officer immediately. Arrangements should be made with the laboratory to immediately ship the missing or additional sampling containers to the project site.
5. Apply WSP Environmental Strategies sample labels to the sample containers.
6. Information on the sample labels should contain the following data:

Site/Project name  
Project/Task number  
Unique sample identification number  
Sample date  
Time of sample collection (military system, e.g., 0000 to 2400 hours)  
Analytical parameters  
Preservative  
Sampling personnel

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7. Once sample containers are properly labeled, the sample labels should be wrapped with clear tape to prevent deterioration of sample label.
8. Proceed with the sample collection per the sampling plan requirements.
9. Collected samples should be immediately placed in an iced cooler to maintain as close as possible a 4°C atmosphere for shipment to the analytical laboratory. Follow sample shipping procedures detailed in Sample Shipping Standard Operating Procedures.
10. Recommended order of sample collection:

*In-situ* measurements (e.g., temperature, pH, specific conductance)  
Volatile organic analytes (VOA)  
Purgeable organic carbon (POC)  
Purgeable organic halogens (POX)  
Total organic halogens (TOX)  
Total organic carbon (TOC)  
Extractable organics  
Total petroleum hydrocarbons (TPH)  
Total metals  
Dissolved metals  
Microbiologicals  
Phenols  
Cyanide  
Sulfate and chloride  
Turbidity  
Nitrate and ammonia  
Radionuclides

**Table 1 – Sample Containers, Preservatives, and Holding Times**

<b><u>Analytical Parameter</u></b>	<b><u>Matrix</u></b>	<b><u>Sampling Container Size and Type</u></b>	<b><u>Preservatives</u></b>	<b><u>Maximum Holding Time</u></b>
Metals, except mercury and hexavalent chromium	Solid	8-oz. glass jar	Cool to 4o C	180 days
Mercury	Solid	8-oz. glass jar	Cool to 4o C	28 days
Hexavalent chromium	Solid	8-oz. glass jar	Cool to 4o C	24 hours
Metals, except mercury and hexavalent chromium	Aqueous	500-ml plastic container with Teflon-lined plastic cap	HNO <sub>3</sub> , pH<2 Cool to 4o C	180 days
Mercury	Aqueous	500-ml plastic container with Teflon-lined plastic cap	HNO <sub>3</sub> , pH<2 Cool to 4o C	28 days
Hexavalent chromium	Aqueous	500-ml plastic container with Teflon-lined plastic cap	Cool to 4o C	24 hours
Volatile organics	Solid	4-oz. glass jar with Teflon-lined cap	Cool to 4o C	14 days
Volatile organics	Aqueous	Three 40-ml glass vials with Teflon-lined caps	HCl, pH<2 Cool to 4o C	14 days

<u>Analytical Parameter</u>	<u>Matrix</u>	<u>Sampling Container Size and Type</u>	<u>Preservatives</u>	<u>Maximum Holding Time</u>
Semivolatile organics	Solid	8-oz. amber glass jar with Teflon-lined cap	Cool to 4o C	14 days to extraction 40 days from extraction to analysis
Semivolatile organics	Aqueous	Two 1,000-ml amber glass jars with Teflon-lined caps	Cool to 4o C	7 days to extraction 40 days from extraction to analysis
Cyanide	Solid	8-oz. glass jar	Cool to 4o C	14 days
Cyanide	Aqueous	One 500-ml plastic container	NaOH, pH>12, Cool to 4o C	14 days
TCLP Volatiles	Solid	8-oz. glass jar with Teflon-lined cap	Cool to 4o C	14 days to TCLP extraction 14 days from extraction to analysis
TCLP Semivolatile Organics	Solid	8-oz. glass jar	Cool to 4o C	14 days for TCLP extraction 7 days for preparative extraction 40 days from extraction to analysis
TCLP Metals, except Mercury	Solid	8-oz. glass jar	Cool to 4o C	180 days for TCLP extraction 180 days from preparative extraction to analysis

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<u>Analytical Parameter</u>	<u>Matrix</u>	<u>Sampling Container Size and Type</u>	<u>Preservatives</u>	<u>Maximum Holding Time</u>
TCLP Mercury	Solid	8-oz. glass jar	Cool to 4o C	28 days for TCLP extraction 28 days from preparative extraction to analysis
Total Petroleum Hydrocarbons	Solid	4-oz. glass jar with Teflon-lined cap	Cool to 4o C	14 days for extraction 40 days for analysis
Total Petroleum Hydrocarbons (EPA Method 418.1)	Aqueous	1-liter amber glass jar	Cool to 4o C	14 days for extraction 40 days for analysis
Total Petroleum Hydrocarbons (EPA Method 8015 GRO)	Aqueous	2 40-ml glass vials	Cool to 4o C	14 days for extraction 40 days for analysis
Total Petroleum Hydrocarbons (EPA Method 8015 DRO)	Aqueous	2 40-ml glass vials	Cool to 4o C	14 days for extraction 40 days for analysis

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## Standard Operating Procedure – 9

### Soil Sampling Using Bucket Auger

#### Materials:

Field log book  
Personal protective equipment (PPE)  
Bucket augers  
Auger extension rods  
Auger handle  
Pipe wrenches (for threaded connections)  
Push pins (for snap connections)  
Stainless steel spoons or trowels  
Mixing tray or bowl  
Plastic sheeting  
Expanding ruler or tape measure

*Note:* Decontamination is not required for dedicated sampling equipment.

#### Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.
2. Remove all vegetation or other surface material (e.g., gravel) with a hand trowel or other tool (e.g., shovel).
3. Advance the borehole to the desired sampling depth (i.e., the top of the sample interval). Attach a decontaminated auger bucket to collect the soil sample.
4. Place the auger bucket in the borehole. Grip the cross-handle with both hands and twist it clockwise to advance the auger.
5. Withdraw the auger bucket from the borehole and place it on plastic sheeting. For VOC samples, use a decontaminated stainless steel spoon or trowel to transfer the sample material directly into the appropriate sample container. A closed-system sampler (e.g., Encore Sampler) should be used, if necessary, to collect sludge samples for VOC analysis using EPA Method 5035 for preservation.
6. Remove the retrieved soil from the bucket with a decontaminated stainless steel spoon or trowel and place the material in a decontaminated mixing tray or bowl. If additional soil is needed to provide sufficient sample volume, repeat Step 4.
7. If necessary, screen the lead end of the auger with a PID/OVA or perform headspace analysis in accordance with SOP 22. Record the reading in the field logbook.

8. Describe the remaining sample material in accordance with ASTM International Standard D 2488 and the Unified Soil Classification System. Record the sample description in the field logbook.
9. For all other parameters, the sample material should be transferred into a decontaminated mixing tray or bowl. Use the stainless steel spoon to separate large clumps of soil material and mix the contents of the tray to a homogeneous particle size and texture.
10. Examine the contents of the tray and remove coarse gravel, organic material (e.g., roots, grass, and woody material) and any other debris with the stainless steel spoon.
11. Transfer the tray contents to the appropriate sample container using a stainless steel spoon.
12. Label the containers, cover the labels with tape, and immediately place the containers in a cooler maintained at an ambient temperature of 4° Celsius with wet ice. Freezer packs or dry ice should not be used for sample preservation.
13. Measure and record the sample depth in the field logbook, along with the sample location, sampler name, and the requested analytical parameters.
14. Complete the chain-of-custody form with appropriate sampling information.
15. Samples should be maintained and shipped in accordance with SOP 20.
16. Properly manage all PPE and investigation-derived wastes in accordance with state and federal requirements.

## Standard Operating Procedure - 11

### Soil Sampling Using Hand Trowel

#### Application:

To collect surface or shallow subsurface soil samples with a hand trowel.

#### Materials:

Field log book  
Personal protective equipment (PPE)  
Stainless steel trowels or spoons  
Mixing tray or bowl  
Plastic sheeting

*Note:* Decontamination is not required for dedicated sampling equipment.

#### Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.
2. Remove the resealable plastic bag and aluminum foil from a decontaminated stainless steel trowel or spoon.
3. Remove any vegetation or other surface material (e.g., gravel) from the sample location with a trowel or other tool (e.g., shovel).
4. Push the trowel or spoon into the soil to the desired sampling depth. If sampling a loose gravelly or sandy soil, carefully remove the trowel so that the blade approaches a horizontal position to prevent soil from falling off the blade. If sampling a stiff silty or clayey soil, it may be necessary to remove and reinsert the trowel to loosen the soil. Shallow subsurface soil samples can be collected by digging a hole (e.g., with a shovel or trowel) and collecting a soil sample at the desired depth. A decontaminated stainless steel trowel or spoon should be used for sample collection.
5. Repeat Step 4 if more soil is needed to provide sufficient sample volume.
6. If required, screen the recovered soil with a PID/OVA or perform headspace analyses in accordance with SOP 22. Record the reading in the field logbook.
7. For VOC samples, transfer soil directly into the sample container with the stainless steel trowel. A closed-system sampler (e.g., Encore Sampler) should be used, if necessary, to collect sludge samples for VOC analysis using EPA Method 5035 for preservation.



8. Describe the remaining sample material in accordance with ASTM International Standard D 2488 and the Unified Soil Classification System. Record the sample description in the field logbook.
9. If soil samples will be collected for non-volatile parameters, use the stainless steel spoon to chop apart clumps of soil material and mix the contents of the tray to a homogeneous particle size and texture.
10. Examine contents of the tray and remove pebbles, organic material, (e.g., roots, grass, and woody material), and other debris with a stainless steel trowel or spoon.
11. Transfer the tray contents to the appropriate sample container using a stainless steel spoon.
12. Label the containers, cover the labels with tape, and immediately place the containers in a cooler maintained at an ambient temperature of 4° Celsius with wet ice. Freezer packs or dry ice should not be used for sample preservation.
13. Record the sample location, sample depth, sampler name, and the requested analytical parameters in the field log book.
14. Complete the chain-of-custody form with appropriate sampling information.
15. Samples should be maintained and shipped in accordance with SOP 20.
16. Properly manage all PPE and investigation-derived wastes in accordance with state and federal requirements.

## Standard Operating Procedure - 19

### Decontamination of Sampling Equipment

#### Materials:

Field logbook  
Personal protective equipment (PPE)  
Deionized water  
10% nitric acid solution  
Nylon brushes  
Containers (e.g., garbage cans, buckets, plastic tubs)  
Nonphosphate detergent (e.g., Liquinox or Alconox)  
Isopropanol  
Aluminum foil  
Polyethylene sheeting  
Plastic garbage bags  
Paper towels  
Spray bottles  
Duct tape

Note: All sampling equipment must be decontaminated before shipment to the office.

#### Decontamination Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.
2. Prepare a decontamination area by spreading polyethylene sheeting on a firm, flat surface (if possible). Create a berm around the decontamination area to contain inadvertent spillage. A berm can be created by rolling under the edges of the polysheeting or by draping the plastic over a wooden frame, etc.
3. Prepare a solution of nonphosphate detergent and tap water in a container.
4. Wipe sampling equipment with paper towels to remove residual soil or gross contamination. Heavy oils or grease may be removed with paper towels soaked with isopropanol.
5. Disassemble sampling equipment (e.g., split-spoon samplers and bailers). Wash equipment thoroughly in a nonphosphate detergent and hot tap water (if available) solution. Teflon bailers must be disassembled and the inside washed with a long-handled bottle brush or short-handled brush pulled through the bailer with rope.
6. Rinse the equipment with hot tap water (if available).

7. If the equipment will be used to collect samples for metals analysis, follow the tap water rinse with a 10% nitric acid solution rinse. Carbon steel equipment (e.g., bucket augers, split-spoons) should be rinsed with 1% nitric acid solution to reduce the potential for oxidizing the metal surfaces. Collect the nitric acid rinse in a separate bucket for proper disposal. Rinse the equipment with tap water.
8. Thoroughly rinse the equipment with deionized water.
9. Spray the equipment with isopropanol and allow to completely air dry. The solvent rinse must be collected in a separate bucket. Isopropanol is the recommended solvent for organic contaminants because it is readily available and is not a Department of Transportation hazardous material. However, other solvents (e.g., acetone, hexane, methanol) may be more effective in removing certain contaminants, such as oils or PCBs. Please note that many state programs and USEPA regions specify the solvents to be used for equipment decontamination.
10. Rinse the equipment with deionized water using at least five times the volume of solvent used in the previous step.
11. After the equipment has been allowed to completely air dry, each piece must be individually wrapped with aluminum foil (shiny side out), and then wrapped in plastic.

**Note: Decontamination solvents may introduce contaminants to environmental samples. It is very important to ensure that the equipment has completely dried before use or storage.**

12. After the final decontamination event on a project, label each piece of equipment with the date of decontamination, the initials of decontamination personnel, and the type of decontamination solutions used.
13. Note any discrepancies from standard decontamination procedures in the field logbook.
14. Field decontamination presents unique problems in disposal of decontamination solutions. The spent wash water and rinse water can potentially be placed in the facility's waste water treatment system. However, field personnel should obtain approval from facility personnel and from the local POTW. If no wastewater treatment system is present onsite, or if approval cannot be obtained from the facility and local POTW, the wash water should be containerized for offsite disposal in accordance with state and federal requirements. The volume of spent solvent generated during field decontamination should be minimal. Solvents should be collected in separate buckets and allowed to evaporate. See SOP 26 for information on managing investigation-derived wastes.
15. Paper towels soaked with solvent should be allowed to air dry and be disposed of with the general trash. Under no circumstances should any decontamination solution be disposed of on soil surfaces.

## Standard Operating Procedure – 20

### Sample Shipping Procedures

#### Materials:

- Suitable shipping container (e.g., plastic cooler or lab supplied styrofoam cooler)
- Chain-of-custody forms
- Custody seals
- WSP Environmental Strategies mailing labels
- Strapping, clear packing, or duct tape
- Ziploc® plastic bags
- Knife or scissors
- Permanent marker
- Latex or nitrile gloves
- Large plastic garbage bag
- Wet ice
- Bubble wrap or other packing material
- Universal sorbent materials
- Sample container custody seals (if required)
- Federal Express form (with WSP Environmental Strategies account number)
- Vermiculite (or commercially available cat litter)

#### Procedures:

For shipping purposes, samples are segregated into two classes; environmental samples and restricted articles (i.e., hazardous materials). Environmental samples can also be categorized based on expected or historical analyte levels (i.e., low or high). An environmental sample is one that is not defined as a hazardous material by the Department of Transportation (DOT, 49 CFR Part 171.8). The DOT defines a "hazardous material" as a substance which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated. Any material of a suspected hazardous nature, previously characterized as hazardous, or known to be hazardous is considered a restricted article.

In general, the two major concerns in shipping samples are protecting the samples from incidental breakage during shipment and complying with applicable DOT and courier requirements for restricted article shipments.

Protecting the samples from incidental breakage can be achieved using "common sense." All samples should be packed in a manner that will not allow them to freely move about in the cooler or shipping container. Glass surfaces should not be allowed to contact each other. When possible, repack the samples in the same materials that they were originally received in from the laboratory. Each container should be cushioned with plastic bubble wrap, styrofoam, or other nonreactive cushioning material. Shipping hazardous materials should conform to the packaging, marking, labeling, and shipping instructions identified in 49 CFR Parts 172 & 173.

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Environmental samples shall be packed for shipment using the following procedures:

1. Line the shipping container with a large, heavy-duty plastic garbage bag. Place universal sorbent materials (e.g., sorbent pads) between the cooler and the heavy-duty plastic bag. The amount of sorbent material should be sufficient to absorb the volume of wet ice and aqueous samples. If using a plastic cooler, securely tape the drain plug closed on the outside of the cooler.
2. Place 2-4 inches of bubble wrap or other packing material inside the heavy-duty plastic bag in the bottom of the cooler.
3. The sample packer should wear latex or nitrile gloves when handling the samples during the packing process.
4. Place the bottles in the cooler with sufficient space to allow for the addition of more bubble wrap or other packing material between the bottles. Large or heavy sample containers should be placed on the bottom of the cooler with lighter samples (i.e., VOAs) placed on top to eliminate breakage.
5. Place the "wet ice" inside two sealed heavy-duty zipper-style plastic bags and package the bags of ice on top of or between the samples. Pack enough ice in the cooler to chill the samples during transit. If the cooler is shipped on a Friday or Saturday for Monday delivery, double the amount of ice placed in the cooler (Monday delivery should be used only as a last resort). Fill all remaining space with bubble wrap or other packing material. Securely close and seal with tape the top of the heavy-duty plastic bag.
6. Place chain-of-custody form (and, if applicable, CLP traffic reports) into a Ziploc® plastic bag and affix to the cooler's inside lid, then close the cooler. Securely fasten the top of the cooler shut with tape. Place two signed and dated chain-of-custody seals on the top and sides of the cooler so that the cooler cannot be opened without breaking the seals.
7. Once cooler is sealed, shake test the cooler to make sure that there are no loose sample containers in the cooler. If loose samples are detected, open the cooler and repack the samples.
8. Using clear tape, affix a mailing label with WSP Environmental Strategies' return address to the top of the cooler.
9. Ship samples via priority overnight express to the contracted analytical laboratory for next morning delivery. If applicable, check the appropriate box on the airbill for Saturday delivery.
10. Declare value of samples on the shipping form for insurance purposes. The declared value should reflect the cost to recollect the samples.

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11. Record the tracking numbers from the Federal Express forms in the field notebook and on the chain of custody form. Also, retain the customer's copy of the Federal Express airbill.

Hazardous materials should be packed according to the above procedures with the following additions:

1. Place samples in individual Ziploc® plastic bags and secure with a plastic tie or tape.
2. Place samples in paint cans in a manner which would prevent bottle breakage (i.e., do not place glass against glass).
3. Place vermiculite or other absorbent packing material in the paint can around the samples. The amount of packing material used should be sufficient to absorb the entire contents of the sample if the container is broken during shipment.
4. Secure a lid to the paint can with can clips and label the outside of the can with sample numbers and quantity. Mark the paint can with "This End Up" and arrow labels that indicate the proper upward position of the paint can.
5. Package the paint cans in DOT-authorized boxes or coolers, with appropriate DOT shipping labels and markings on two adjacent sides of the box or cooler.
6. Ship the restricted articles via overnight courier following the courier's documentation requirements. A special airbill must be completed for each shipment. Retain a copy of the airbill for WSP Environmental Strategies records and tracking purposes, if necessary.

## Standard Operating Procedure – 21

### Field Quality Assurance/Quality Control Samples

#### Materials:

Field logbook  
Personal protective equipment (PPE)  
Sample containers  
Sample labels  
Clear tape  
Laboratory analyte free water  
Clean or dedicated sampling equipment

#### Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.
2. Select the appropriate glassware for the field Quality Assurance/Quality Control (QA/QC) samples. Refer to the WSP Environmental Strategies Standard Operating Procedure for Sample Container, Preservatives, and Holding Times to determine the appropriate bottles to use.
3. Field QA/QC samples include the following:
  - trip blanks
  - duplicate samples
  - equipment blanks
4. Trip blanks should be provided by the analytical laboratory for all projects where samples are being collected for analysis of volatile organic compounds (VOCs). Trip blanks should accompany the sample bottles from the analytical laboratory to the site, accompany the sample containers at all times during the sampling event, and return to the laboratory with the sample containers. One trip blank should be submitted to the analytical laboratory with each shipment containing samples for VOC analysis. The trip blank should be analyzed only for VOCs.
5. One duplicate sample should be collected for every 20 samples of each matrix (e.g., soil and groundwater) collected during each sampling event. Duplicate samples of soil and other solid matrices should be collected by dividing the sample material in half and alternately filling the two sample bottle sets. Duplicate samples of groundwater and other aqueous matrices should be collected by alternately filling the two sample bottle sets from the same sampling vessel (e.g., bailer). The appropriate SOP should be followed for the collection of each sample type (soil, groundwater, sediment, sludge). Duplicate samples should be analyzed for all the analytes that are being analyzed for during the sampling event.

6. One equipment blank should be collected in the field at a rate of one per type of equipment per decontamination event not to exceed one per day. If dedicated sampling equipment is used, the equipment blanks should be prepared in the field before sampling begins. If field decontamination of sampling equipment is required, the equipment blanks should be prepared after the equipment has been used and field-decontaminated at least once. Equipment blanks should be prepared by filling or rinsing the precleaned equipment with analyte-free water and collecting the rinsate in the appropriate sample containers. The samples should be labeled, preserved, and filtered (if required) in the same manner as the environmental samples. Equipment blanks should be analyzed for all the analytes for which the environmental samples are being analyzed. Decontamination of the equipment following equipment blank procurement is not required.
7. All QA/QC samples should be submitted to the analytical laboratory with unique sample numbers. Therefore, the QA/QC samples should be labeled as separate environmental samples following the same numbering scheme used during that particular sampling event. However, the QA/QC samples should be clearly identified on WSP Environmental Strategies' copy of the chain-of-custody form and in the field logbook.



## Standard Operating Procedure - 22

### Soil Head Space Screening (Field Technique)

#### Materials:

PPE  
Field logbook  
Photoionization detector (PID) and/or Flame Ionization Detector (FID)  
Aluminum foil  
Clear 8-oz to 16-oz glass large-mouth containers with lids  
Stainless steel spoon  
Zipper-style plastic bags

#### Procedure:

1. Use appropriate PPE as specified in the site-specific health and safety plan.
2. Check PID to ensure that it is working properly.
3. Using WSP Environmental Strategies' standard operating procedure (SOP) for collecting soil, sludge, or sediment, half-fill a clean glass jar with sample. Place a piece of aluminum foil over the top of the jar and tightly seal the jar. Label the jar indicating the sampling location, depth, and date. Store the jar upside down until the sample is analyzed.
4. If jars are not available, collect the sample using a zipper-style plastic bag (e.g., Ziploc®). Seal and label the bag as specified in item 3.
5. Shake the sample vigorously for approximately 15 seconds.
6. If necessary, warm the sample to room temperature (70°F) by placing the jar in a heated room or vehicle. This step is very important when the ambient temperature is below 32° F.
7. After waiting approximately 15 minutes, carefully unscrew the lid of the jar without disturbing the aluminum foil. Pierce a hole through the aluminum foil using the tip of the PID. If using zipper-style bags, open the bag slightly and place the tip of the probe into the opening. Do not insert the probe into the soil and avoid the uptake of water droplets.
8. Following probe insertion, record the highest meter response. Using the foil seal/probe insertion method, maximum response should occur between 2 seconds and 5 seconds. Erratic PID response may result from high organic vapor concentrations or elevated headspace moisture. If these conditions exist, the headspace data should be qualified or discounted.

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9. Record the sample location, depth, soil texture (i.e., clay or sand), and PID reading in the field notebook. Also record the ambient temperature, humidity, and whether moisture was present in the jar or plastic bag. These points are important because on very cold days volatilization of organic compounds is reduced and water vapor present in the jar may cause the PID to give a false reading. Be consistent in your procedure and in your recording of the data.
10. Duplicate 10 % of the headspace samples by collecting two samples from the same location and following items 2 through 9 above. The headspace screening data from both jars should be recorded and compared. Generally, replicate values should be consistent to plus or minus 20%.
11. Samples collected for headspace screening should not be retained for laboratory analysis. Dispose of the soil and jar appropriately.

Underground Utility Locating

Application:

The purpose of this procedure is to ensure that all required and appropriate procedures are followed to locate and mark subsurface utilities (e.g., electrical lines, natural gas lines, communication lines) before initiating any intrusive field activities (e.g., drilling, test pits, trenching). Compliance with this procedure is mandatory before intrusive work can be conducted on a WSP Environmental Strategies project. This procedure is intended to allow the work to proceed safely and will minimize the potential for damaging underground utilities. Intrusive work includes all activities that require WSP Environmental Strategies' employees or their subcontractors to penetrate the ground surface. Examples of intrusive work include, but are not limited to probing, drilling, injection, test pit excavations, trenching, and remedial excavations.

Materials:

Record of the communication utility locating form (Attachment 1)  
Field logbook  
Wooden stakes  
Spray paint  
Flagging tape  
As-built drawings for sub grade utilities (if available)  
Hand auger or post-hole digger  
Hand-held magnetometer or cable locator (optional, if and only if private utility locator has cleared the area and personnel have been properly trained in the use of the equipment)

Procedure:

Pre-site Mobilization

1. Gather the necessary information to complete the record of communication utility locating form (Attachment 1).
2. Contact the state utility locating service (e.g., One-Call, Miss-Dig). It is imperative to contact the locating service with sufficient lead-time to allow all utility providers to visit the site location. In each case, the state utility locating service will provide the caller with a legal dig date. Under no circumstances will intrusive work begin before the legal dig date provided by the call center. The telephone numbers for the locating service in selected states are listed in Table 1. However, the telephone number is typically listed in the area Yellow Pages. Provide the utility locating service with any information they request concerning the site and work activity in order to locate utilities at the site. Several states, including California, require that the proposed drilling locations be

marked with white spray paint before contacting the locating services. The following information provided by the locating service should be documented in a record of communication utility locating form (Attachment 1): utility providers that will be contacted, and a utility clearance ticket number. The ticket number will be used by the various utility companies to reference the clearance request and to contact the caller with clearance verifications (see note below).

Note 1: Generally, the public utility companies will mark underground lines up to the private property boundary. However, you should request that the utility companies mark their utilities in the work areas on the site. If the utility companies will not provide that service, a private utility locating service **MUST** be contracted.

Note 2: Some utilities (e.g., sewer, water, cable TV) may not be included by the State locating service. The State locating service will provide you with a list of utilities that will be notified based on the information provided regarding the sites location. Compare this list with utilities generally expected at all sites (e.g., sewer, water, gas, communication, electric). If any expected utilities are absent from the contact list, you **MUST** contact the utilities directly for clearance before the start of intrusive activities. Record all contacts on the utility locating record of communication form.

3. Identify a site contact familiar with the utilities on the property (e.g., plant manager, facility engineer, maintenance supervisor), and provide this individual with a site plan showing the proposed locations of all soil borings, monitoring wells, test pits, and other areas where intrusive activities will be conducted. Ask the site contact for all drawings concerning underground utilities in the proposed work areas.
4. No intrusive work should be done before the legal dig date provided by the State utility locating service. No intrusive activities should be conducted along or near public right-of-ways until all utilities have been marked and visually verified in the area of investigation. In addition, **NO** field activities shall be conducted on private property unless the State locating service or a private utility locating service has confirmed the presence or clearance of onsite utilities.

#### Site Mobilization

1. Locate all proposed drilling and trenching locations, both onsite and offsite, with spray paint, stakes, or other appropriate markers.
2. Verify that **ALL** utility companies listed by the municipal locating service, and any contacted directly by WSP Environmental Strategies, have either marked the underground lines in the specified work areas or have responded with "no conflict." Document on the utility record of communication form as each utility mark is visually confirmed.

**Note:** When receiving verbal clearances by telephone from utility companies, or their subcontractors, it is imperative that you verify which utilities are being cleared, particularly when dealing with subcontractors that may be marking more than one utility.

3. Review all available as-built utility diagrams and plans with the site contact to identify potential areas where underground lines may be present. The review should confirm the locations marked by the locating services and identify utilities that may have been omitted by the locating services. If the as-built drawings do not confirm utilities marked by the locating services, follow instructions in Section 6. If possible, obtain a copy(s) of the utility plans for future reference in the field.

Conduct a site walk with the site contact. During the site walk, attempt to obtain a general knowledge of the types of utilities present in the work areas. Furthermore, survey your surroundings to identify features that require electricity (e.g., parking lot lights, pad-mounted transformers) or suggest the presence of underground utilities, such as linear depressions in the ground. Check these items against the utility locating record of communication form checklist. For example, check to see whether major electrical lines are aboveground, or locate underground sewer lines by using the locations of manholes and storm water grates. Keep in mind that many sewer lines can be offset from catch basins.

4. A minimum of 4 feet clearance should exist between utilities and proposed drilling locations, and a minimum of 6 feet between utilities and proposed trenching locations. A minimum distance of 15 feet should be maintained by heavy equipment (e.g., excavator buckets, drill rig towers and rods) from overhead power lines. A safe distance of 25 feet should be maintained from high tension overhead power lines. In the event that work must be conducted within 25 feet of high tension wires, the lines should be wrapped and insulated by the local utilities. If a utility conflict is identified, adjust the proposed location(s) using the criteria given above. These minimum distances should be increased whenever possible to offer additional assurance that utilities will not be encountered.
5. A private utility locating service **MUST** be used for work on private property in cases where the public utility locating service does not mark utilities on the subject property. It is **NOT ACCEPTABLE** to rely on as-built drawings or verbal utility clearances. A private locator may not be necessary in rare instances; however, these cases must be discussed with the project manager **AND** a partner or executive partner of WSP Environmental Strategies before work may proceed.

A listing of several private subsurface utility locating firms is provided in Table 2. In addition, a hand-held magnetometer or magnetic-cable locating device can be used to augment, but not replace, clearance for each work area. Use of this equipment is restricted to employees with proper training on the use of hand-held utility locating equipment. Proper training is defined as having working knowledge of the manufacturer's operating procedures, and the completion of at least one successful location under the supervision of a qualified person.

6. In some cases, state and private locating services may not be able to identify all utilities. In areas where uncertainty still exists concerning the presence of underground utilities after clearance by state and private locating services, a hand auger or post-hole digger can be used to probe the shallow subsurface before using any heavy equipment (drill rig, backhoe). The probe hole should be advanced a minimum of 4 feet below ground surface at each proposed drilling or excavation location. A sufficient number of probe holes should be completed so that the area is cleared for the proposed intrusive activity. For drilling, a minimum of three holes installed in a triangular pattern should be advanced at each location. The use of hand digging methods in **NO WAY** replaces the need State and private utility locating services. Hand digging techniques should only be employed if uncertainty regarding the location of underground lines still exist after clearances by the State locating service and a private locating service.
7. Discuss the site conditions with the subcontractor and recommend that care be used at the start of the intrusive activities. Field personnel should always consider the presence of unidentified utilities at each work area. In addition, field personnel have the authority and responsibility to postpone intrusive activities if insufficient information, as stipulated in this SOP, is available, or if onsite reconnaissance identifies inconsistencies in the findings of utility locators. In these instances, field personnel should contact the project manager or a member of the health and safety committee, and an executive partner or partner of WSP Environmental Strategies before proceeding with the proposed work. The first priority on every project is to ensure that the work is conducted safely.

Again, it is the requirement of this SOP to obtain site utility clearances from the State utility locating service. If the State locating service does not provide onsite (i.e., work area) utility clearance, a private locating service must be contracted to clear the work areas before digging, drilling, or probing begins. Although certain instances and site conditions may appear to allow intrusive work without prior clearance, **ALL** deviations from this SOP **MUST** be approved by the project manager and a partner or executive partner **BEFORE** beginning intrusive work.

8. If the scope of the intrusive activity locations change, the scope of intrusion expands or includes a new onsite or offsite area(s), review the existing information to determine whether the area(s) can be safely cleared of all potential underground utilities. If necessary, contact the state locating service and request another clearance for the new area(s) of investigation and retain a private locator in accordance with Item 5 above. Remember, the new request will provide a new legal dig date before which **NO INTRUSIVE WORK CAN BEGIN**. Additionally, if a clearance ticket will expire while the work is ongoing (typically after 14 days), a new clearance must be requested at before the first ticket expires so that work can continue uninterrupted. Refer to the communication utility locating form for the legal dig date time frame required by the State locating service.

**PUBLIC and PRIVATE UTILITY LOCATING FORM**

Project: \_\_\_\_\_ Project Manager: \_\_\_\_\_

Project Number: \_\_\_\_\_

Project Start Date: \_\_\_\_\_ Duration of Project: \_\_\_\_\_

Project Location (Site Address): \_\_\_\_\_

Project Site Description (complete the following with all information available before calling):

Work Being Done For: (*Company or Individual Name*): \_\_\_\_\_

State: \_\_\_\_\_ County: \_\_\_\_\_ City/Place: \_\_\_\_\_

Street: \_\_\_\_\_ (*Only one street per ticket*) Zip Code: \_\_\_\_\_

Nearest Intersecting Street: \_\_\_\_\_

Lat/Long: \_\_\_\_\_ Parcel/Tax map ID: \_\_\_\_\_

Description of the area to be marked (*Provide the following: Street working on, which side of street, how far in which direction from nearest intersecting street; etc.*):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Locations for proposed borings or digging identified with paint and/or stakes? (circle one): YES  
NO N/A

**NOW, MAKE THE CALL:**

Call Placed to Phone No.: \_\_\_\_\_

Date of Call: \_\_\_\_\_ Time of Call: \_\_\_\_\_ a.m. / p.m.

Ticket No. Assigned to Location Request: \_\_\_\_\_

Assigned Legal Dig Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_ Assigned Legal Dig Time: \_\_\_\_ AM / PM

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**The Following Table Must Be Completed Before Work Can Begin:**

CALL BACK/FAX BACK INFORMATION RECORD						
	Gas	Communication	Electric	Water	Sewer	Other
Responsible Company (provided by OneCall operator)						
Date Notified						
Time Notified						
Notified By						
Phone Number						
Marks Complete						
No Conflict						
No Facilities						

Calls Made By: \_\_\_\_\_ Form Completed By: \_\_\_\_\_

Project Manager Notified of Results (initial if completed): \_\_\_\_\_

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**Onsite Underground and Overhead Utility Clearance Checklist**

Visual Confirmation of Marked Public Utilities:

Utility Type	Visual Cues	Marks Confirmed (initial)	No Markings Seen (initial)
Water	Blue Markings, fire hydrant, manholes; water meter, sprinkler heads, AST, hose bib		
Gas	Yellow Markings, gas meter, manholes; yellow bollards		
Electric	Red Markings, parking lot lights, overhead lines (telephone poles), underground vaults, manholes; conduit on buildings		
Sewer (sanitary/storm)	White or Blue Markings, underground vaults, manholes, drain grates		
Communication	Red or White Markings, red bollards, telephone poles; manholes; conduit on buildings		

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Visual Confirmation of Marked Private Utilities (at onsite drilling/digging locations):

Utility Type	Visual Cues	Marks Confirmed	No Markings Seen (initial)	Not Applicable (initial)
Water	fire hydrant, manholes; water meter, ASTs, interior connections, hose bib, valve box			
Irrigation	sprinkler heads, hose bibs			
Gas	gas meter, manholes; yellow bollards, interior connections, valve box			
Electric	parking lot lights, interior connections, overhead lines, underground vaults, manholes, transformers/switchgear; conduit on buildings			
Sanitary/Storm/Septic System	underground vaults, manholes, drain grates, leach field, sand mound, no evidence of sanitary sewer (for septic system)			
Production Equipment	USTs (fill pipes and vent pipes), ASTs (overhead and underground pipelines), manholes/valve pits; pump islands			
Communication	Red/orange bollards, telephone poles, interior connections; manholes; conduit on buildings			

**If any Utilities have "No Marking Seen" checked, private locating must be conducted to clear each drilling/digging area.**

Site Visit Made By: \_\_\_\_\_

Form Completed By: \_\_\_\_\_

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## Standard Operating Procedure -- 24

### Soil Sampling Using GeoProbe® System or Equivalent

#### Application:

To perform depth-discrete soil sampling with 2-foot or 4-foot long samplers using hydraulically-driven soil sampling equipment (GeoProbe® System or Equivalent).

#### Materials:

Stainless steel soil sampler (2-foot or 4-foot long)  
Clear acetate liners  
Tape measure or expandable ruler  
Utility knife  
Photoionization detector (PID)  
Stainless steel spoons  
Aluminum tray or stainless steel mixing bowl<sup>a</sup>  
Nitrile or latex gloves  
Field notebook

#### Procedure:

1. Calibrate the PID in accordance to the manufacturers instructions. Decontaminate all down-hole sampling equipment and the utility knife, spoons, and mixing bowl per SOP 19 before initiating any boring activities. Ensure that the location is clear of all underground utilities and pipelines.
2. Attach a decontaminated 2-foot or 4-foot long stainless steel sampler fitted with a new, clear acetate liner and a decontaminated removable cutting shoe to small-diameter rods. Lower the stainless steel sampler to the top of the desired sampling depth.
3. Advance the stainless steel sampler through the desired sample interval. Record in the dedicated field notebook the interval through which the sampler was pushed.
4. After the sampler has reached the desired depth, retrieve the sampler by first removing the rods and then disconnecting the sampler. Remove the cutting shoe and acetate liner containing the soil column from the sampler. Measure the length of the material recovered relative to the interval the sampler was advanced, and record this information in the field notebook.
5. Cut the acetate liner using a utility knife to expose the recovered soil. Quickly scan the recovered soil with the PID and if necessary, immediately collect samples for VOC analysis. If the plan indicates the collection of samples for headspace analysis, collect this sample after obtaining the sample for VOC analysis per SOP 22. Record the PID readings in the field notebook.

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6. For VOC samples, transfer soil directly from the acetate liner into the sample containers with a clean, stainless steel spoon. Fill the VOC sample container with a representative sample from the entire length of the recovered sample core, or other designated sample interval<sup>a</sup>. Fill the VOC container completely, leaving no headspace.
  7. Describe the recovered soil using the Unified Soil Classification System or standard geological descriptions. Record the sample description in the field notebook.
  8. If it is necessary to mix the sample, transfer the soil from the acetate liner to a clean aluminum tray or decontaminated stainless steel mixing bowl with a decontaminated stainless steel spoon<sup>b</sup>.
  9. Examine contents of the tray/bowl and remove rock fragments and organic debris, such as roots, grass, and woody material, with the stainless steel spoon. Use the same spoon to chop apart clumps of dirt and mix the contents of the tray to a homogeneous particle size and soil texture. Transfer the tray/bowl contents to the appropriate sample containers using the stainless steel spoon.
  10. The sample container(s) should be sealed, labeled, and placed in a cooler with ice or freezer packs to maintain 4° Celsius for shipment to the analytical laboratory.
  11. Complete the chain-of-custody form with the appropriate sampling information.
    - a. *NJDEP's Field Sampling Procedures Manual requires the collection of soil samples for VOC analysis from the 0.5-foot interval that exhibits the highest reading during the field (PID) screening.*
    - b. *U.S. Environmental Protection Agency (EPA) Region 4 requires a glass bowl for homogenizing soil for sample collection.*